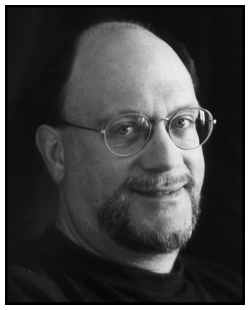
SE3 Last Mile Access Options: PON/DSL/Cable/Wireless



Co-Organizer/Chair: Larry DeVito, Analog Devices, Wilmington, MA
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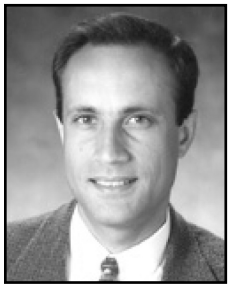
Passive Optical Network (PON) is the next step in the evolution of the access network. The opportunity is to offer a triple play of high-speed Internet, voice over IP (VOIP), and multi-channel television (TV) to your home. Especially rapid growth in high-definition TV, needing six times more bandwidth than standard-definition TV, is one driver of the movement to increase bandwidth of access networks. Passive Optical Network (PON) and wireless access networks are now offering an alternative to familiar Cable and DSL networks. Over 2.5 million PON are installed in Japan, and deployment now begins in North America. The worldwide market is projected to be hundreds of millions of households; naturally such a huge opportunity is creates fierce competition. Advances in silicon LSI for each LAST MILE ACCESS OPTION is surely the key to survival. This session introduces the major options for current and future broadband access networks. The speakers in this special education session come from various areas. Mr. Quigley presents Cable market and technology; Dr. Khotimsky and Dr. Nakagawa, introduce PON for the US and the Far East; Mr. Namaji and Mr. Hauptmann explain DSL from the view of market analysis and technology; and Dr. Soumyanath introduces impact and technical challenge of low-cost Wireless access. This comprehensive coverage of access solutions introduces attendees the practical system and LSI technology and the market with hopes of stimulating new advances from silicon providers.

Position Statements

Cable Continues to Dominate High Speed Access in the Next Five Years
Thomas Quigley, Broadcom, NC
Despite significant challenges from other high speed access methods, including VDSL2, PON, Wireless, and their variants, Cable's DOCSIS communications standard will continue to dominate the high speed data market in North America. The new DOCSIS 3.0 specifications provide extensive new tools to provide high speed access with extensive QoS support, enhancing Voice over IP, Video over IP, higher speed data access and regular standard and high definition broadcast and PPV video. DOCSIS 3.0 sets the stage for operators to move all their digital data transmission onto a common IP based communications platform and speed their transition to an all digital pipe to the home. This paper will look at the some of the key features of the 3.0 specification, including downstream and upstream channel bonding, statistical multiplexing gain, IPV6 support, and enhanced security.

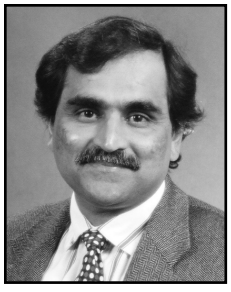
Progress and Perspectives of PON for Residential Broadband Access
Denis A. Khotimsky, Motorola, Lecce, Italy
In North America, all major carriers are in various stages of implementing FTTP/FTTN projects. Verizon is rolling out the FiOS FTTP service with the plans to be adding 3 mln homes each year for the next few years to 6 mln homes already passed by the end of 2006. AT&T is pursuing FTTN strategy having deployed fiber in the Dallas, TX, area. The technology of choice is FSAN/ITU's Broadband PON with subsequent migration to Gigabit PON. This choice is due to the support of the carrier-class quality standards that the legacy carriers have always adhered to. This presentation will cover the early history and the evolution of the technology, the standardization efforts, the service evolution to fully-fledged triple play and RBOCs' massive move into the video business, as well as the technological advances and perspectives for the future.

Optical and Circuit Design Challenges for High Speed PON Systems
Jun-ichi Nakagawa, Mitsubishi Electric, Kanagawa, Japan
The rapid growth of IP traffic has spurred the development of low-cost and convenient broadband access services. GE-PON (Gigabit Ethernet Passive Optical Network) has recently attracted a great deal of attention as a way of exceeding 1Gb/s for Fiber-to-the-Home (FTTH) systems. The standardization of GE-PON was completed by the IEEE802.3ah committee in 2004, and GE-PON systems are being now introduced into commercial networks in Japan. In the PON-based network architecture, multiple optical network unit (ONUs) located at the subscribers' premises are connected with an optical line terminal (OLT) through a single optical fiber and a tree network based on a 1:N passive star coupler, thus the PON system is the most promising solution for reducing installation and operating costs by sharing fibers and OLT equipment. This presentation will review the optical and circuit design challenges in GE-PON and high-speed next generation PON systems.



A View into the Future of DSL Broadband Access Market; Why the Market Analysts are Wrong
Cyrus K. Namazi, Conexant Systems, Red Bank, NJ
Worldwide DSL market penetration has surpassed all other forms of broadband access technologies combined. Many market analysts have been predicting a decline in the rate of DSL penetration growth rates for some time. Yet, less than 5% of the world's phone lines are connected to DSL networks. At over 150m DSL subscribers, as of June 2006, the majority of the world remains "unconnected". The DSL broadband access market is undergoing a fundamental shift in its market drivers which is creating a different set of dynamics in demand for semiconductors, systems, and services. This presentation focuses on the forces driving these changes and their impact on the future of broadband and in particular DSL.

Ongoing Innovation in DSL: The Enabler for Triple-Play Over the Last Mile
Jörg Hauptmann, Infineon Technologies AUSTRIA AG, Villach, Austria
Datarate requirements to and from home are steadily increasing due to new service offering like triple-play (data, voice, video). Multitude of different access technologies have been deployed and standardized. While PON is used in new access networks offering very high bandwidth, DSL is reusing the billions of available twisted pairs of the classical plain old telephone service (POTS). Many innovative steps have been done to bring the overall system costs continuously down, while the offered bandwidth was increasing at the same time. Today VDSL2 with 30MHz bandwidth can offer 100 Mbit symmetrical data rate and enables real triple play. This talk will highlight the diversity of different DSL technologies and applications, where major themes are cost per port, maximum flexible bandwidth and high bitrates with reasonable low power. Latest design challenges on Linedriver, Analog Frontends, DSP and externals will be presented.



Low Cost Wireless as an Alternative for Last Mile Access
Krishnamurthy Soumyanath, Intel, Hillsboro, OR
Wireless links are emerging as significant contenders in the battle for last mile access. The importance of wireless as an alternative source is being driven by the rapid adoption of new standards (like Wimax), the emergence of new standards activities in the mmwave space and the dramatic improvements in cost/performance of CMOS wireless ICs. In many emerging economies wireless access removes the need for expensive infrastructure upgrades/installations, making it a very attractive choice for broad band connectivity. This is particularly true of markets that are outside of the relatively well developed metro areas. In this talk we will outline the challenges and opportunities for a significant wireless presence in the last mile. We will discus strategies for achieving high performance in various frequency bands and discuss the complementary digital processing technologies that will allow low cost, broadband system realizations.